

Robotics

(Course viewgraphs)

João Silva Sequeira¹

¹joao.silva.sequeira@tecnico.ulisboa.pt

Winter P2, 2024-2025

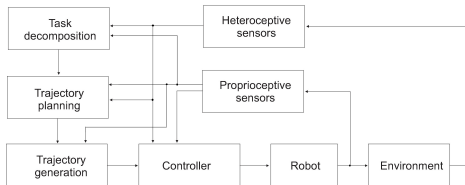
Robot control architectures II

- An architecture is a network of building blocks.

Each of these blocks provides a functionality (or a service) and exchanges information with some or all of the others and the external environment.

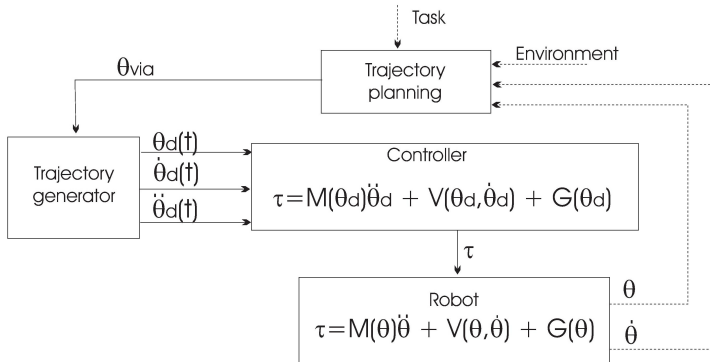
- In general, the functionalities provided by the building blocks are defined according to some rational criteria.
- Functionalities might not be easily formalized

Robot control architectures

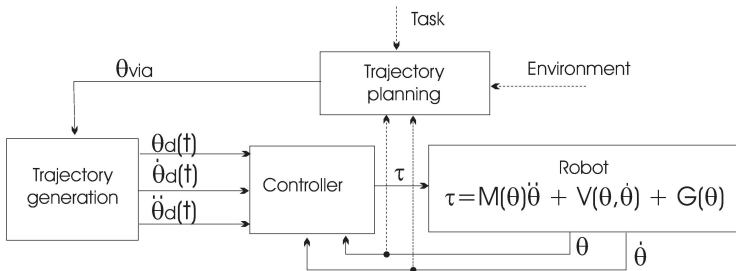


- Task decomposition, what are the resources required
- Trajectory planning, what kind of motion to use, e.g., to avoid obstacles
- Trajectory generation, transform the trajectories planned in the workspace to the operational space
- Controller, for trajectory following
- Proprioceptive sensors, give information on the state of the robot
- Heteroceptive sensors, give information on the environment

Robot control – Low level in open loop



Robot control – Low level in closed loop



Robotics functionalities and the GNC pipeline I

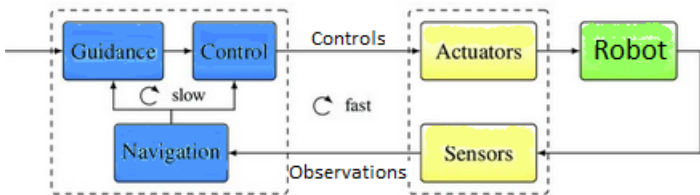
GUIDANCE Establishment of the desired reference path to follow (current, i.e. in real-time and future)

NAVIGATION Estimation of the current state and prediction of future state

CONTROL Actions to match the current state (navigation) with the foreseen path (guidance)

Source: ESA Guidance, Navigation, and Control Systems. Guillermo.Ortega@esa.int

Robotics functionalities and the GNC pipeline II



Robotics functionalities and the GNC pipeline III

